The effect of large scale synoptic-climatological changes in the Carpathian Basin

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Recently, several unusual weather events have occurred in the Carpathian Basin. For example huge amount of precipitation was detected both in winter and spring 2012-2013, as well, as in summer 2014. According to our hypothesis these extreme wet conditions in the region are related to the jet stream in the upper tropospheric levels. This paper aims to evaluate our base hypothesis, and quantify the relationship between regional meteorological events and the jet streams over Europe.

First, a general statistical analysis of jet stream characteristics is performed for the region, including the evaluation of (i) the frequency of those days when a jet stream is located above the Carpathian Basin, (ii) the typical height of the jet core, (iii) the jet wind vector consisting of wind speed and direction, and (iv) the relationship between the jet and local/regional weather events. Detected changes of the position and the intensity of the jet stream is also analyzed for the last few decades. Furthermore, teleconnection patterns, i.e., the North-Atlantic Oscillation (NAO) and the Arctic Oscillation (AO), which are closely linked to the jet stream, are also examined. In addition to the jet stream, these teleconnection systems are also linked to the local weather conditions, therefore, correlation patterns are calculated between daily data of various meteorological elements and daily NAO and AO index values for 30 years (1981-2010), and for specific seasonal and monthly time scales for the Carpathian region.